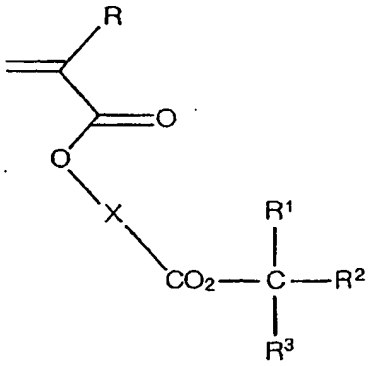
CLAIMS

1. A method of forming a resist pattern comprising: a resist pattern formation step, in which a positive resist composition comprising a resin component (A) that displays increased alkali solubility under action of acid, and an acid generator component (B) that generates acid on exposure is applied to a substrate, a prebake is conducted, said resist composition is selectively exposed, post exposure baking (PEB) is conducted, and alkali developing is used to form a resist pattern; and a narrowing step in which a pattern size of said resist pattern is narrowed by heat treatment, wherein

said component (A) utilizes a resin with a structural unit (a1) derived from a (meth)acrylate ester represented by a general formula (I) shown below:



... (I)

wherein, R represents a hydrogen atom or a methyl group; X represents a hydrocarbon group with 1 to 4 rings; R^1 to R^3 either each represent, independently, a lower alkyl group, or alternatively, one of R^1 to R^3 represents a lower alkyl group, and two remaining groups represent lower alkylene groups, terminals of which are bonded together to form a single ring containing 5 or 6 carbon atoms including bonded terminal carbon atoms.

2. A method of forming a resist pattern according to claim 1, wherein said component (A) utilizes a resin with a structural unit (a1) in which said groups R^1 to R^3 each represent, independently, a lower alkyl group.

3. A method of forming a resist pattern according to claim 2, wherein said component (A) utilizes a resin with a structural unit (a1) in which said lower alkyl groups are either methyl groups or ethyl groups.

4. A method of forming a resist pattern according to claim 1, wherein said component (A) utilizes a resin further comprising a structural unit (a2) derived from a (meth)acrylate ester with a lactone unit.

5. A method of forming a resist pattern according to claim 1, wherein said component (B) utilizes an onium salt with a fluorinated alkylsulfonate ion as an anion.

6. A method of forming a resist pattern according to claim 1, wherein said positive resist composition further comprises a secondary or a tertiary lower aliphatic amine.

7. A method of forming a resist pattern according to claim 1, wherein said narrowing step is a thermal flow process in which said resist pattern is heated and softened, and a pattern size of said resist pattern is narrowed.

8. A method of forming a resist pattern according to claim 7, wherein said positive resist composition further comprises a compound with at least two vinyl ether groups, which reacts with said resin component (A) on heating and forms cross linking.

9. A method of forming a resist pattern according to claim 1, wherein said narrowing step is a shrink process, in which a water soluble resin coating comprising a water soluble polymer is provided on top of said resist pattern, and subsequently heated, causing said water soluble resin coating to shrink, thereby narrowing a spacing of said resist pattern.

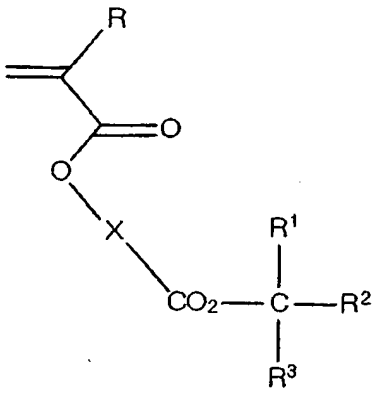
10. A method of forming a resist pattern according to claim 9, wherein said water soluble polymer utilizes a polymer comprising a structural unit derived from at least one monomer which acts as a proton donor, and a structural unit derived from at least one monomer which acts as a proton acceptor.

11. A method of forming a resist pattern according to claim 10, wherein said water soluble polymer is at least one polymer selected from a group consisting of acrylic based polymers, vinyl based polymers, cellulose based derivatives, alkylene glycol based polymers, urea based polymers, melamine based polymers, epoxy based polymers, and amide based polymers.

12. A method of forming a resist pattern according to claim 9, wherein said water soluble resin coating further comprises a water soluble amine and/or a surfactant.

13. A positive resist composition for use within a method of forming a resist pattern according to claim 1, comprising a resin component (A) that displays increased alkali solubility under action of acid, and an acid generator component (B) that generates acid on exposure, wherein

said component (A) is a resin with a structural unit (a1) derived from a (meth)acrylate ester represented by a general formula (I) shown below:



... (I)

wherein, R represents a hydrogen atom or a methyl group; X represents a hydrocarbon group with 1 to 4 rings; R^1 to R^3 either each represent, independently, a lower alkyl group, or alternatively, one of R^1 to R^3 represents a lower alkyl group, and two remaining groups represent lower alkylene groups, terminals of which are bonded together to form a single ring containing 5 or 6 carbon atoms including bonded terminal carbon atoms.

14. A layered product in which a resist layer formed from a positive resist composition according to claim 13, and a water soluble resin coating comprising a water soluble polymer on the resist layer are layered onto a substrate.